

REMARKS

Claims 11-18 are pending in this application. Of these pending claims, Claims 11-18 stand rejected. By way of this paper, Claims 11 and 14-17 have been amended.

The foregoing amendments and following remarks are believed to be fully responsive to the outstanding office action, and are believed to place the application in condition for allowance.

Formal Drawings

Formal drawings are being submitted herewith under separate cover to the attention of the draftsman. No amendments to the drawings have been made by way of this paper. Applicants request consideration and approval of the formal drawings by the Examiner.

Claim Rejections – 35 U.S.C. § 112, second paragraph

Claims 11-18 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to point out particularly and claim distinctly the subject matter that Applicants regard as the invention. By way of this paper, Claim 11 has been amended to point out particularly and claim distinctly the subject matter that Applicants regard as the invention so as to overcome the rejection under 35 U.S.C. §112, second paragraph. Claims 12-18 depend either directly or indirectly from independent Claim 11. As such, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §112, second paragraph, rejections of Claims 11-18

Claim Rejections – 35 U.S.C. § 102

Claims 11-18 stand rejected under 35 U.S.C. §102(b) as being anticipated by the Hulderman ('511) reference.

Independent Claim 11 has been amended to more clearly point out that the three dimensional electroformed structure uses a sacrificial controlled-release layer as shown clearly in Figure 1 and Figure 2H of Applicants' invention. Applicants respectfully submit that the prior art cited above does not disclose, teach, suggest, or contemplate this feature of a sacrificial controlled-release layer whatsoever.

In this regard, Applicants submit that the Hulderman reference discloses a millimeter wave device that contains a photoresist layer and a thermal layer, wherein the photoresist layer is removed after the formation of the metal layer (See Sheet 7-9, Figures 12A – 12H, 13A- 13D, and 14A – 14G of ‘511). Even though the photoresist layer is removed, the Hulderman reference does not teach a sacrificial controlled-release layer as taught in the application as filed (See Paragraph [00018] of the current application).

Applicant’s mandrel for use in fabricating three dimensional orifice plates includes a substrate base 16, a sacrificial controlled-release layer 18 applied to the substrate base, a conductive metal layer 20 applied to the sacrificial controlled-release layer, optional thin resist pegs 22, optional additional nickel layers 24, and optional trench mask 26.

Sheet 7 of the Hulderman reference depicts a substrate, wherein with portions of the substrate (400) are masked by a non-conductive photoresist layer (428, 430, 432, 434) (See Figure 12E of ‘511). In the Hulderman reference, the photoresist layer is not serving as a release layer because the photoresist layer does not cover the entire surface of the substrate, which would be needed for a controlled release layer.

Further, when describing the application of a separation layer on the substrate prior to applying the photoresist, the Hulderman reference teaches separation coatings that are conductive passivation layers, which are all well known in the art of electroplating (See Column 15, Lines 7-14 of ‘511). Conductive passivation layers do not provide the adhesion required to prevent the electroformed structure from delaminating from the substrate during the electroforming process (See Paragraph [00016] of the current application). While the adhesion of these passivation layers may be sufficient for the Hulderman reference, the lack of adhesion is insufficient for the Applicant’s mandrel.

In the Applicant’s mandrel, the plating of two layer nickel electroformed structures produces significant increases in the stress levels in the plating that would cause the electroformed structure to peel loose from at least some portions of the mandrel, thereby ruining the electroformed structure (See Paragraph [00017] of the current application). The Applicant’s sacrificial controlled-release layers provide the necessary adhesion of the electroformed

structure to prevent such delamination. The controlled release layers still provide a manner for removal of the electroformed structure from the mandrel.

The major distinction between the Applicant's controlled-release layer and the Hulderman reference separation coating is that the Applicant's controlled-release layer is sacrificial. Removal of the electroformed structure from the mandrel involves either chemical removal of the controlled release layer or the fracturing of the controlled release layer (See Paragraph [00018] of the current application). Using either removal method, the conductive metal layer remains attached to the electroformed structure. The conductive layer can then be removed by etching from the electroformed structure, if desired. In contrast, the Hulderman reference separation coatings are not intrinsically destroyed during the removal of the electroformed structure from the mandrel.

Applicant's controlled-release layer and the Hulderman reference separation coating both conform to the shape of the surface to which the coating is applied. The Applicant's controlled-release layer is applied as a liquid that is subsequently hardened. Since the layer is applied as a liquid, the surface tension of layer has the intrinsic effect of producing a smooth surface without the need for polishing. The Hulderman reference separation coating does not produce the desired smoothing of the surface.

Sheet 9 of the Hulderman reference depicts an alternative process is described, wherein photoresist mask areas (606, 608, 610, 612, 614) are formed in the substrate and then metal is plated onto the unmasked substrate sections, forming metal pillars (616, 618, 620, 622). The photoresist is removed and the tops of the metal pillars are machined off to produce the mandrel structure shown in Figure 14E. A separation coating is applied over the substrate (604) and the metal pillars. Further, per Sheet 9, the Hulderman reference does not use a conductive metal layer over the separation coating, as in the Applicant's mandrel structure.

As such, Applicants respectfully submit that the present invention is patentably distinct over the prior art cited above. Accordingly, reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection of Claims 11-18 is respectfully requested.

Claims 11-18 stand rejected under 35 U.S.C. §102(b) as being anticipated by the Lam ('971) reference.

Independent Claim 11 has been amended to more clearly point out the use of a sacrificial controlled-release layer as shown clearly in Figure 1 and Figure 2H of Applicants' invention. Applicants respectfully submit that the prior art cited above does not disclose, teach, suggest, or contemplate this feature whatsoever.

In this regard, Applicants submit that the Lam reference discloses teaches a thin film mandrel that employs a glass substrate 1-7, an adhesion layer 1-11, and a conductive stainless steel layer 1-5 to produce a reusable mandrel (See Column 3, Lines 24-28 of '971). The adhesion layer provides the adhesion to hold the stainless steel layer to the glass. The adhesion layer in Lam reference, however, does not provide a manner to remove the electroformed structure from the substrate using a sacrificial release layer as called for in the present application.

Applicant's sacrificial controlled-release layer 18 is not an adhesion layer as taught in the Lam reference. Applicant's sacrificial controlled-release layer 18 is deposited by "spin coating" (See Paragraph [00015] of the current application). The conductive metal layer 20, not the controlled-release layer 18, adheres to the lower layer, typically a metal layer. The Lam reference's adhesion layer is not a sacrificial layer as in the Applicant's embodiments.

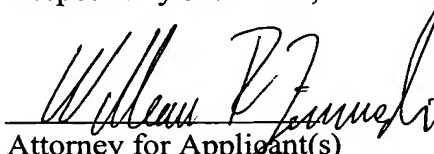
As such, Applicants respectfully submit that the present invention is patentably distinct over the prior art cited above. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §102(b) rejection of Claim 11-18 is respectfully requested.

CONCLUSION

It is respectfully submitted that, in view of the above amendments and remarks, this application, with currently pending claims 11-18, is now in condition for allowance, prompt notice of which is earnestly solicited.

The Examiner is invited to call the undersigned in the event that a phone interview will expedite prosecution of this application towards allowance.

Respectfully submitted,



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